REMARKS

I. History and Current Status of Claims.

Claims 1-32 were originally presented for examination before the United States Patent and Trademark Office (the "Office") with filing of a patent application on July 7, 2001. The first Office Action provides the following: objection to Claims 17 and 21 because of informalities; rejection of Claims 1, 3-7, 9, 10-12, 14 and 16 under 35 U.S.C. § 102(b) as being anticipated by Pinnock (WO 99/39169 A1); rejection of Claims 8, 13 17-19 and 22-32 under 35 U.S.C. §103(a) as being unpatentable over Pinnock in view of Burke, Jr (US 3,688,570). rejection of Claims 2 and 15 under 35 U.S.C. §103(a) as being unpatentable over Pinnock in view of Cui et al (US No. 6,115,111); and rejection of Claims 20 and 21 under 35 U.S.C. §103(a) as being unpatentable over Pinnock as modified by Burke, Jr further in view of Cui et al. In his response to the first office action, Applicant cancelled claims 2, 15 and 20 and amended claims 1, 11, 17, 19 and 22. Claims 1, 3-14, and 16-19, and 21-32 remained pending in the present application.

In a second Office Action dated 3/01/04, made Final, claims 1, 3-7, 9-12, 14 and 16 were being rejected under 35 U.S.C. §103(a) as being unpatentable over Pinnock in view of Cui, and claims 8,13,17-19 and 21-32 were being rejected under 35 U.S.C. §103(a) as being unpatentable over Pinnock in view of Cui and Burke. In response, Applicant amended claims 1, 3, 4, 7, 8, 11, 17, and 24 and submitted remarks. In an advisory action dated 5/26/2004, the office maintained its previous rejections. Applicant filed a RCE application July 1, 2004 and submitted its claim amendments submitted in the after final communication with the Office. The amendments were entered.

In its first communication after Applicant filed an RCE, the office rejected claims 1, 3, 4, 7, 9 and 10 under 35 U.S.C. §103(a) as being unpatentable over Dalton et al (US 6,679,126) in view of Cui, claims 11, 12, 14 and 16 as being rejected under 35 U.S.C. §103(a) as being unpatentable over Pinnock in view of Cui, claim 8 as being unpatentable over Dalton et al (US 6,679,126) in view of Cui, and further in view of Burke; and claims 17-19 and 21-32 under 35 U.S.C. §103(a) as being unpatentable over Pinnock in view of Cui. And Burke. In response, amended claims 1, 14, 16, 18, 19, 21, 22, 23, 24, 25, 28, 29, 30, 31 and 32, and added new claims 33 and 34.

In its second communication, made final and for which the present response is being filed, the office rejects all the claims under 35 USC 103 using as its primary references, either Pinnock or Dalton et al. Applicant amends claim 1 and 33, and 34 in a manner that ensure clarity over what is patentable about his invention, and is not taught by the cited art. Applicant cancels claims 18, 26 and 28. Claims 2, 5, 6, 11, 13, 17, 20, 26 and 28 now stand cancelled in the application. Claims 1, 3, 4, 7-10, 12, 14-16, 18, 19, 21-25, 27, and 29-34 remain pending in the applicaton.

Applicant now respectfully requests reconsideration of his application.

II. The Invention.

Applicant's invention is measures torque and displacement between two rotating shafts. Two shafts are connected together using a torsion bar. Transparent disks are mounted to each of the shafts near each shafts coupling to the torsion bar. The transparent discs have encoded surfaces on their inner surfaces (meaning the encoded surfaces face each other) and form a gap between them because of how they are mounted to the shafts near the torsion bar. A beam of light from a VCSEL is transmitted through the two disks, but part of the light can not transmit through the encoded surfaces of each disk. Light that does pass through the disk and is not blocked by the encoded patterns is received by a detection module located opposite the light source near the outer surface of one of the disks. A unique signal is received, which is the result of the transmitted beam of light from the first transparent disk interacts with the encoded pattern of the second transparent disk as part of the light beam is transmitted through the disks. The affected beam can be used to determine torque and movement between the shafts, via the disks, because of the interaction of light with the two unique patterns from each disk. The affected beam can be received after passing through the disks and patterns by a sensor plate and/or a detection module wherein the beam is analyzed for displacement and torque between the two disks and, ultimately, the rotating shafts. The detection module can provide feedback to the mechanical system to improve/adjust system performance given movement of the shafts.

III. Primary References - Dalton et al and Pinnock

It has been pointed out before by Applicant that *Dalton et a*l and *Pinnock* are similar inventions because they both utilize two wheels/disks having slots/slits formed thereon and attached along a shaft to measure torque and angular position/displacement when light is allowed to pass through the slots/slits formed on the two wheels/disks. The disks taught by *Pinnock* or *Dalton* are not transparent (utilizing solid, non-transparent disks with slits/slots formed thereon for passing light). Neither system collimates light during operation. Neither system uses VCESLs. Neither system would work if their disks were bonded together as suggested in the *Renner* patent (U.S. US 4,641,027) and cited by the Office.

IV. Rejection of Claims 1, 3, 4, 7, 9 and 10 as being unpatentable over Dalton et al (US 6,679,126) in view of Cui (US 6,399,940)and *Renner et al* patent (U.S. US 4,641,027).

Claims 1, 3, 4, 7, 9 and 10 currently stand rejected by the Office under 35 U.S.C. §103 as being obviated by *Dalton et al* in view of *Cui* and *Renner et al* (US 4,641,027).

Dalton et al does not teach transparent disks or the use of VCSELs. Perfect alignment of the collimated light beam is required in both horizontal and vertical directions using *Dalton's* invention. The *Dalton et al* disk are cut into in order to create slits used to pass a light beam. The *Dalton* disks are not equivalent to transparent disks. Alignment between two disks used in *Dalton* is more critical because of the light-blocking characteristics of the solid metal disks used therein.

Dalton et al does not teach use of VSCEL; however, *Ciu* is cited for teaching a VCSEL, but does not teach a system like *Dalton et al's*. There is no hint or suggestion in *Cui* to use VSCELs in a system like described in *Dalton et al.* Furthermore, the combination would not result in overcoming alignment issues faced where solid disks are used.

The *Renner et al* reference is cited for its teaching of transparent material in disk form. The disks in *Renner*, however, are not able to freely rotate because the disks are bonded 65 together at their periphery 60, 61. Furthermore, the disks are commonly mounted to the same shaft 13. One skilled in the art would not be motivated to combine

Renner with *Dalton et al*, and also *Ciu* to arrive at Applicant's invention. The primary reason a combination is not suggested by the art and would not be motivated by it is because the combination would fail! Applicant's invention requires that the disks move independently of each other. This is possible because the disks are mounted on two shafts that are coupled together by a torsion bar.

It would not be obvious to those skilled in the art to combine *Dalton et al.* and Ciu and *Renner* to arrive at a system as claimed by Applicant. The combination does not teach or suggest the use, or benefits of using, independently rotatable transparent disks mounted separately to dedicated shafts that are coupled together by a torsion bar, and to imprint or adhere bar-code-like patterns to the inner, facing surfaces of the disks so that light showing through the transparent disks and interfered with by the patterns can be recorded by a detector, and ultimately provide means to record a mechanical systems operation. Also, and more importantly, the combination does not teach a system that will work. For the above reasons, the rejection of independent claim 1, and its dependent claims 3, 4, 7, 9, and 10 is respectfully traversed.

For purposes of providing clarity over claim 1 prior to allowance, Claim 1 has been amended to better define Applicant's invention as follows:

1. A method for analyzing the performance of a system, comprising the steps of:

directing collimated light from at least one vertical cavity surface-emitting laser (VCSEL) towards identically encoded portions representing unconnected lines of a bar code formed on planar surfaces formed on and located near outer perimeters and inner surfaces of two transparent disks that are independently rotatable on two shafts including ends commonly separated by and coupled to a torsion bar, said two transparent disks each representing input and output mechanisms of the system;

transmitting a portion of the light passing through the transparent disks and not blocked by the encoded portion towards at least one of a sensor plate or detector; and

detecting the portion of the light passing through the transparent disks and not blocked by the encoded portion using the at least one of the sensor plate or detector.

IV. Rejection of Claims 11, 12, 14 and 16 as being unpatentable over Pinnock in view of Cui and Renner.

Claims 12, 14, 16 and 33 currently stand rejected by the Office under 35 U.S.C. §103 as being obviated by *Pinnock et al* in view of *Cui* and *Renner*.

Pinnock et al, like *Dalton et al* discussed above, describes solid (non-light transparent) disks that are cut into in order to create slits used to pass a light beam. The *Pinnock et al* disks are not equivalent to transparent disks. Alignment between two disks used in *Pinnock* is more critical because of the light-blocking characteristics of the solid metal disks used therein. Furthermore, *Pinnock et al* does teach or suggest the use a collimator and/or *Pinnock et al* does not teach or suggest the use a VCSEL. *Ciu* is cited for teaching a VCSEL; but *Ciu* does not teach a two disk, torque measuring system. *Ciu* also does not teach the use of transparent medium. *Renner* is cited for its use of transparent disks; however *Renner's* disks are boded 65 together at their outer periphery 60, 61, which prevents them from moving independently of each other. Therefore, *Renner's* combination with *Pinnock* and *Ciu* would not result in an operable device. Therefore one skilled in the art would not be motivated to use *Renner* for its teaching of transparent medium in combination with *Pinnock*; especially because *Pinnock* does not require transparency with its integrated slits/cuts. An obvious combination that can pass muster under 35 U.S.C. §103 has not been shown by the Examiner. It would not be obvious to those skilled in the art to combine *Pinnock et al.* and *Ciu* and *Renner* to arrive at a system as claimed by Applicant in independent claim 33, let alone a functional system given the severe limitation of *Renner*. The combination does not teach or suggest the use, or benefits of using, transparent disks that are rotatable independently from each other, and to imprint or adhere bar-code-like patterns thereon to the inner, facing surfaces of transparent disks. For the above reasons, the rejection of claims 33, 12, 14 and 16 is respectfully traversed.

Claim 33 has been amended in order to provide clarity to the claim prior to its allowance. Claim 33, from which claims 12, 14 and 16 depend, now reads as follows:

33. An apparatus for analyzing the performance of a mechanical system including independently rotatable input and output shafts with ends being separated by and coupled to a torsion bar, said apparatus comprising:

two transparent disks independently attached near the ends of the input and output shafts wherein the ends are being separated by and coupled to a torsion bar, wherein each of said transparent disks include inward facing surfaces, said inward facing surfaces forming a gap between the two transparent disks based on the disks' placement on the ends of the input and output shafts which are separated by and coupled to a torsion bar;

bar-code-like encoded portions formed on the inward facing surfaces of the two transparent disks;

at least one directing element that directs light from a vertical cavity surface-emitting laser (VCSEL) through the two transparent disks in order to intercept the bar-code-like encoded portions, wherein a portion of light is transmitted through the bar-code-like encoded portions of the two transparent disks to at least one detector or sensor plate; and

at least one detector module to receive the transmitted portion of light.

V. Rejection of Claim 8 as being unpatentable over *Dalton et al* as modified by Cui et al and *Renner*, and further in view of *Burke Jr.*

Claim 8 is dependent on Claim 1, for which arguments traversing the rejection of claim 1 have already been provided. Claim 8 stands or falls based on the allowability of claim 1. *Burke Jr.* teaches a system like *Dalton* and *Pinnock* for detecting Moire fringes on a sensor; but *Burke Jr.* does not overcome the arguments proffered in support of Claim 1; therefore the rejection of claim 8 is respectfully traversed.

VI. Rejection of Claims 18, 19, 21-32 and 34 as being unpatentable over Pinnock in view of Cui et al, Renner and Burke Jr.

As discussed above with respect to claims 1 and 33, it would not be obvious to those skilled in the art to combine *Pinnock et al.* with Ciu and *Renner,* specifically:

- Alignment between the two disks used in *Pinnock* is more critical because of the light-blocking characteristics of the solid metal disks used therein.

- *Pinnock et al* does teach or suggest the use a collimator
- *Pinnock et al* does not teach or suggest the use a VCSEL. *Ciu* is only cited for teaching a VCSEL; but *Ciu* does not teach a two disk, torque measuring system. *Ciu* also does not teach the use of transparent medium.
- *Renner* is cited for its use of transparent disks; however *Renner's* disks are boded 65 together at their outer periphery 60, 61, which prevents them from moving independently of each other. Therefore, *Renner's* combination with *Pinnock* and *Ciu* would not result in an operable device.
- One skilled in the art would not be motivated to use *Renner* for its teaching of transparent medium in combination with *Pinnock*; especially because *Pinnock* does not require transparency with its integrated slits/cuts.
- *Burke Jr.* teaches a system like *Dalton* and *Pinnock* for detecting Moire fringes on a sensor; but *Burke Jr.* does not overcome the arguments against *Renner*.

An obvious combination that can pass muster under 35 U.S.C. §103 has again not been shown by the Examiner. It would not be obvious to those skilled in the art to combine *Pinnock et al.* and *Ciu* and *Renner* and Burke to arrive at a system as claimed by Applicant in independent claim 34, let alone a functional system given the severe limitation of *Renner*. The combination does not teach or suggest the use, or benefits of using, transparent disks that are rotatable independently from each other, and to imprint or adhere bar-code-like patterns thereon to the inner, facing surfaces of transparent disks.

Given these arguments, it is even further remote that one skilled in the art would be motivated to combine *Pinnock et al.* with Ciu and *Renner* and *Burke Jr.* to arrive at an apparatus as claimed by Applicant in independent claim 34. For the above reasons, the rejection of independent claim 34 and its dependent claims 18, 19 and 21-32 is respectfully traversed.

Claim 34, from which claims 18, 19 and 21-32 depend, has been amended for clarity purposes to reads as follows:

34. An apparatus for detecting the relative motion between at least two rotating members in a mechanical system, comprising:

a vertical cavity surface-emitting laser (VCSEL) for generating a light beam;

a first encoded portion representing unconnected lines of a bar code located on an inner surface of a first transparent disk, said first encoded portion facing a second encoded portion also representing unconnected lines of a bar code located on an inner surface of a second transparent disk facing the second encoded portion, said first and second encoded portions used for the transmission of images created using the light beam as it passes through the transparent disks towards at least one of a sensor plate or detector, wherein said first and second transparent disks each have an outer surface; and

at least one detector module located proximate to said mechanical system near at least one outer surface associated with the second transparent disk and the VCSEL is located proximate to said mechanical system near the outer surface associated with the first transparent disk, and wherein the light beam transmitted by the VCSEL travels through the transparent disks and encoded portions to the said at least one detector module;

wherein the light beam can be used to detect Moirè fringes formed as a result of the interaction of the images from said first and second encoded portions.

VII. Conclusion

Applicant has responded to each and every objection and rejection of the Official Action. Applicant respectfully submits that the foregoing amendment to claims 1, 33 and 34 and the above remarks do not present new issues for consideration and that no new search is necessitated. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the objections and the rejections and requests timely issuance of the present application

The Examiner is respectfully requested to contact the undersigned representative to conduct an interview in an effort to expedite prosecution in connection with the present application should there be any outstanding matters that need to be resolved.

Respectfully submitted for,

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